

REVIEW OF *GOYA* RAGONOT AND DESCRIPTION OF A
NEW SPECIES, *G. SIMULATA* FROM PARANÁ, BRAZIL
(LEPIDOPTERA: PYRALIDAE: PEORIINAE)

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Abstract.—*Goya simulata* is described from Curitiba, Paraná, Brazil. Included are photographs of adult moths, head profiles, genitalia of both sexes, scanning electron micrographs of male antennae, and a discussion of the genus with a key to the four known species. *G. simulata* is compared with the male holotype of the presumably sympatric sibling species, *G. albivenella* and with the female lectotype of its junior synonym *G. cancelliella*.

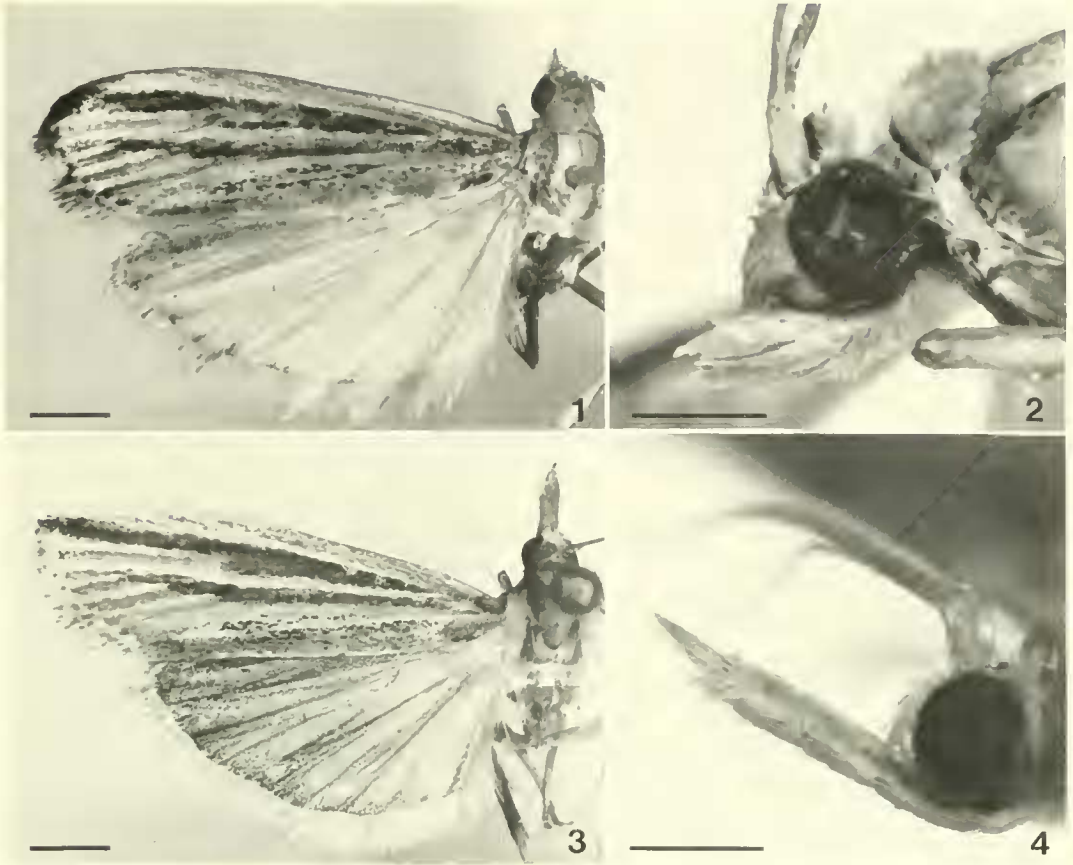
Key Words: *Goya albivenella*, *G. cancelliella*, *G. stictella*, *G. ovaliger*, taxonomy, neotropical lepidoptera

While recently examining a series of Brazilian pyralid moths from the collection of Dr. Vitor Becker, I sorted out six specimens from Paraná which appeared to belong to *Goya albivenella* Ragonot, 1888. This species is known only from the male type and, if the association is correct, 2 nontopotypic females. On examination of the genitalia it was clear that the 2 males in the series were specifically different from *albivenella* and represented an undescribed species. The 4 females are likewise distinctly different in genital characteristics from specimens presumed to be *albivenella*. The new species is described below.

Goya Ragonot, 1888 was erected for two species, including *G. albivenella*, described from Goya, Corrientes, Argentina, and subsequently designated as the type of the genus (Hampson in Ragonot, 1901: 349). The other originally included species is African, clearly peoriine, but of uncertain generic affinity as it is known only from the female type, not yet associated with male specimens. Shaffer (1968: 56) transferred *Sahuria stictella* Hampson, 1918 to *Goya*, and *Ato-*

pothoures ovaliger Blanchard, 1975 was shifted to *Goya* (Blanchard, 1978: 55), with *Atopothoures* Blanchard, 1975 becoming a junior synonym of *Goya*.

The last redescription of the genus (Shaffer 1968: 56) was based on the 2 species known at the time. With the discovery of 2 additional species, the distinction between specific and generic characters becomes more apparent, and it seems worthwhile to comment on these. In all 4 species the uncus possesses a medial process of variable shape and armament, but always with a pair of posteriorly directed spines along the caudal margin. These spines are large in the 2 North American species, moderate in *albivenella* (Fig. 18), and small in *simulata* (Fig. 13 s). The paired lateral processes of the uncus are rhomboidal, pad-like, sparsely setose, and vary little from species to species. They are unusual apomorphies unlike those of any other known peoriine. The medial process of the gnathos is unique in detail for each species, but very close in the two North American ones and subject to individual variation (see below). Also, its appearance

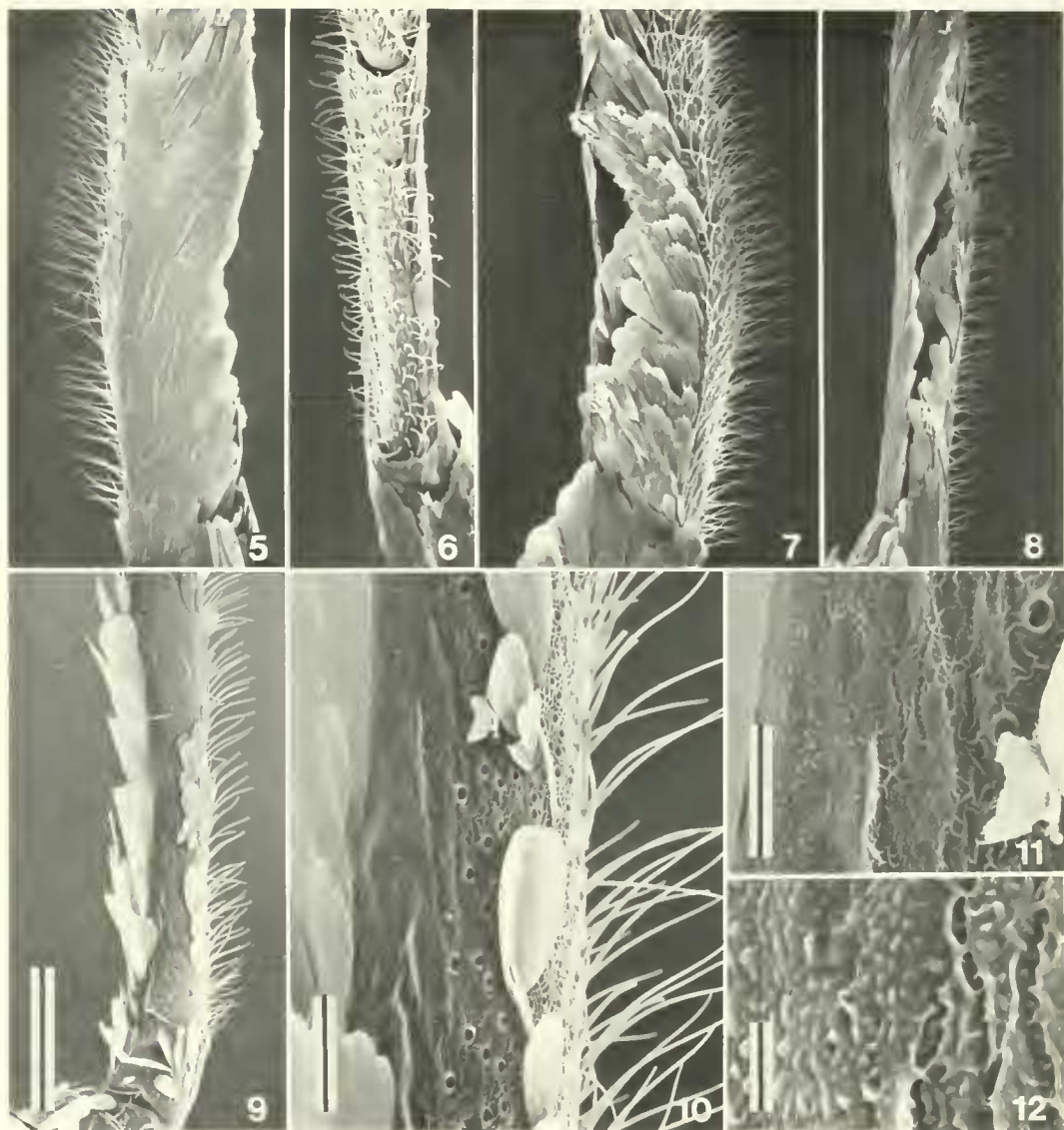


Figs. 1-4. *Goya simulata*. 1, ♂ holotype; 2, ♂ holotype, head, lateral view; 3, ♀ paratype coll. 25 XII 1974; 4, ♀ paratype coll. 4 II 1975, head, lateral view. Scale bar = 2.0 mm (1, 3), 1.0 mm (2, 4).

on prepared slides varies much depending on the extent to which it is compressed by the coverglass. Compare, for example, Figs. 16 and 17. These appear quite different because the flaps seen on edge in Fig. 16 were flattened in the other preparation and so appear broadside. A stereoscopic view of the actual preparations reveals them to be essentially identical. Few peiriines have the transtilla developed, but in *Goya* it is present in all four species, incomplete and in the form of simple narrow bars (Figs. 13, 18 tr). The valve shows relatively minor interspecific variation, always more or less parallel sided, apically diagonally truncate, and unarmed. The aedeagus is simple, variable in

shape, always short; it and the vesica are always unarmed but for minute denticles.

The female genitalia of peiriines tend to be simple and rather uniform with the ovipositor compressed, the ostial chamber membranous and unmodified, and the signum only rarely present. Most often it is not possible to identify peiriine species on the basis of the female genitalia. Those of *Goya* generally fit the above pattern, but are distinct for each of the 4 species. Also, they exhibit two apomorphies each diagnostic of the genus. Most evident of the two is a large dorsocaudal sac on the 8th segment. It appears somewhat different in each species, but is in every case well developed. Similar

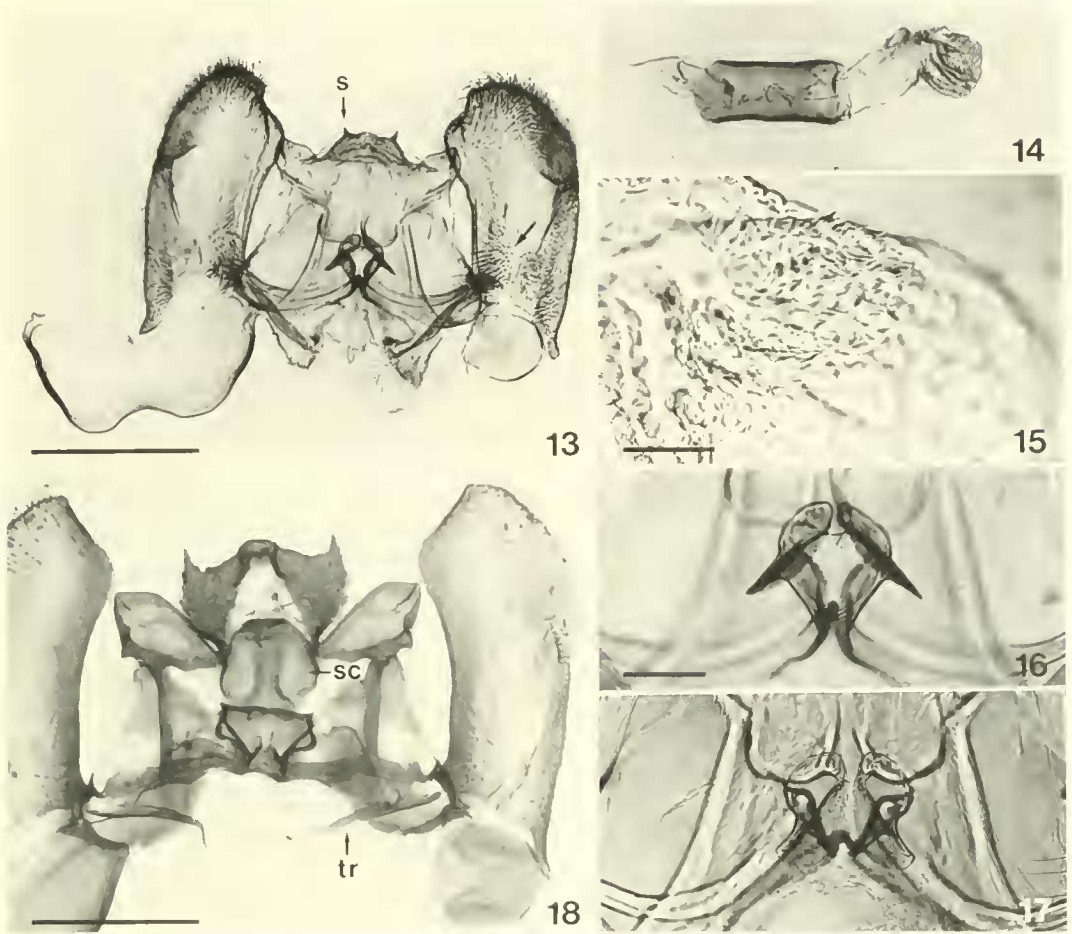


Figs. 5-12. *Goya simulata*, basal modification of male antennal shaft. 5-8, holotype, left antenna, showing 5, lateral; 6, anterior; 7, medial; and 8, posterior views. 9-12, paratype, left antenna partly denuded to show surface enclosed by scale tufts, same perspective as in 8. Scale bar = 500 μm (5-9), 50 μm (10), 25 μm (11), 5 μm (12).

features appear in two other New World peoriine genera. In *Atascosa* all 4 known species have a well developed narrow digitate invagination in this position (see Shaffer 1976, Plate 14e, g, i), and females of *Coenotropa* have paired short pouches (ibid., Plate 14b, c) in the same place. The mark-

edly different development of these sacs suggests an independent development for each genus.

The other apomorphy is more easily overlooked. The 7-8 intersegmental membrane is dorsally thickened and folded so as to form an anterodorsal pocket at the an-



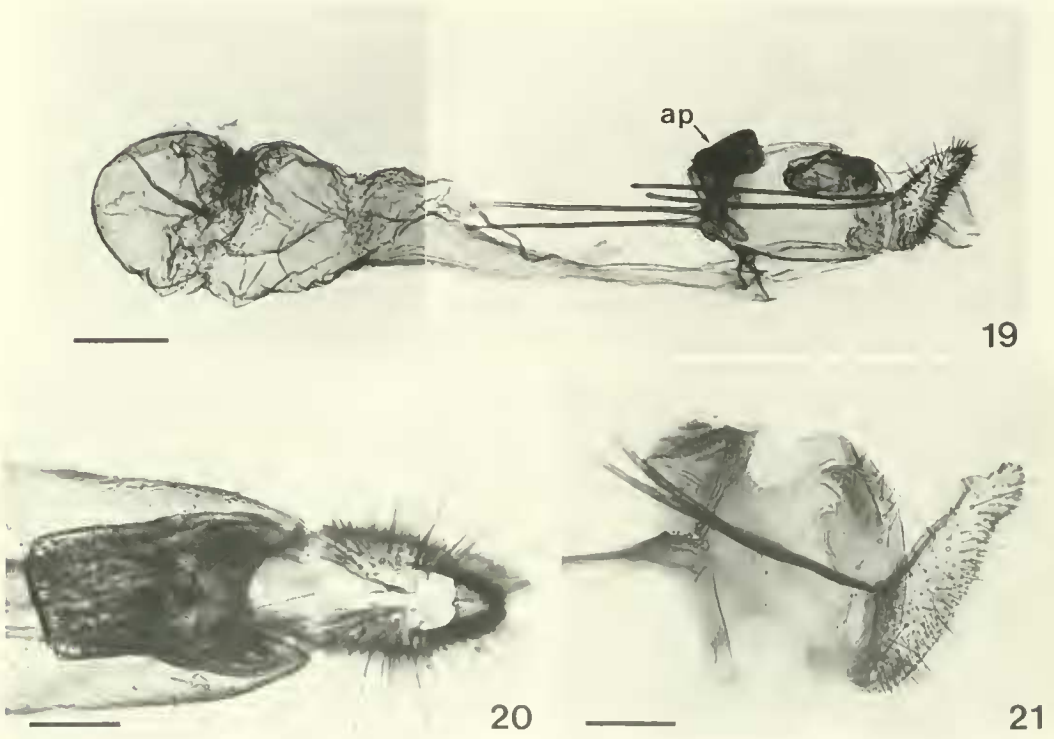
Figs. 13-18. Male genitalia. 13-16, *Goya simulata*, holotype; 13, male genitalia (aedeagus omitted); 14, aedeagus; 15, detail of vesica enlarged to show denticles; 16, medial process of gnathos; 17, paratype, medial process of gnathos, compressed by coverglass; 18, *G. albivenella*, lectotype, s = uncus spine, se = subscaphium, tr = transtilla. Scale bar = 1 mm (13, 14), 0.05 mm (15), 0.2 mm (16, 17), 0.5 mm (18).

terior of the 8th segment collar. This feature is present in all four species and is illustrated for *simulata* in Fig. 19 (ap).

Distributions of *Goya* spp.—Two species are North American. *G. stictella* was described from Andros Island, Bahamas and is represented from Florida, Mississippi, Arkansas, and Texas. Blanchard's *ovaliger* is so far known only from Texas. He and I have collected both species by blacklight at the Welder Wildlife Refuge near Sinton, Texas. Either or both may range into Mexico, but are yet unknown there. *G. albivenel-*

la is known with certainty only from the type locality, Goya, Corrientes, Argentina, but the two female specimens from Espirito Santo and Pernambuco, Brazil are likely conspecific. The latter (Fig. 21) is the lectotype of *cancelliella* (Ragonot), a junior synonym of *albivenella*, and is clearly distinct from females of *simulata*. *G. simulata* is described from the state of Paraná, Brazil. The holotype and female paratypes are from Curitiba and the male paratype is from Quatro Barras, about 100 km to the east.

The 2 North American species, if in rea-



Figs. 19-21. Female genitalia. 19, *Goya simulata*, paratype, USNM slide 57903, lateral view; 20, same, dorsal view of eighth segment modification; 21, *G. albivenella*, lectotype of its junior synonym *G. cancelliella* (Ragonot), J. Shaffer slide 1181, lateral view. ap = anterodorsal pouch. Scale bar = 0.5 mm (19), 0.2 mm (20, 21).

sonably good condition, are readily distinguished by wing pattern, whereas the genital differences are minor and show overlapping individual variation. The 2 South American species are very close in wing pattern, and larger series of specimens will have to be examined to properly assess individual variation. Fortunately, the two species have distinctly different genitalia in both sexes.

KEY TO SPECIES OF *GOYA*

- 1. Forewing with well developed spots or transverse bands; ♂ genitalia with subscaaphium weakly sclerotized; aedeagus strongly flared basally in vertical plane; North American 2
- Forewing lacking well developed spots or transverse bands, veins prominently traced with white; ♂ genitalia with subscaaphium well sclerotized, prominent, shield shaped (Fig. 18sc); aedeagus subcylindrical, not flared; South American 3

- 2. Forewing with well developed continuous antemedial and postmedial lines, discocellular spot a dark circle with pale center; medial process of gnathos usually with >2 denticles per side *ovaliger*
- Forewing lacking developed antemedial line; postmedial line discontinuous, formed of spots; discal spot small, solid; large dark spot on 2nd A posterior to cell; medial process of gnathos usually with 0-2 denticles per side *stictella*
- 3. ♂ genitalia with medial process of uncus bearing numerous minute spines on ventral surface (Fig. 18); apical process of gnathos subquadrate; valve lacking patch of setae near base of costa (Fig. 18); ♀ genitalia with apophyses of normal length; 8th segment collar about as long as high; forewing 3rd A white-scaled *albivenella*
- ♂ genitalia with medial process of uncus smooth but for pair of small spines on caudal margin (Fig. 13); apical process of gnathos cordate and strongly bilobed; valve with conspicuous patch of setae near base of costa (Fig. 13); ♀ genitalia with apophyses long; 8th segment collar about

1.7 times as long as high; forewing 3rd A with little or no white scaling *simulata*

***Goya simulata* Shaffer, NEW SPECIES**

Figs. 1–17, 19, 20

Diagnosis.—The single pair of very short uncus spines (Fig. 13 s) and the well developed hair tuft at the base of the valve costa (Fig. 13 diagonal arrow) are each unique to *simulata*, as are the unusually elongate eighth segment and apophyses of the female (Fig. 19).

Description.—Frons brown. Labial palpus obliquely ascending in both sexes; in male (Fig. 2) 2.6 times as long as eye diameter, 2nd segment narrow, gradually expanded distally (unrubbed condition), apically truncate; 3rd segment short, narrow, fusiform, set off from second; basal segment white, 2nd and 3rd segments brown dorsally, white ventrally, demarcation irregular; female (Fig. 4) similar to male, but unusually long and slender, 3.3–3.7 times as long as eye diameter. Maxillary palpus cylindrical, approaching end of frons, usually hidden by labials. Proboscis rudimentary. Male antenna shaft sublaminar, basal modification (Figs. 5–12) with segments partly fused, posterior surface with tuft of opposing bands of scales, unequal (cf. Figs. 5, 7), astride of and enclosing a surface that appears smooth at low magnification (Fig. 9), but at higher resolution irregularly carinate (Fig. 10), very finely rugose and mammillate (Figs. 11, 12). Female antenna filiform, unmodified. Eye diameter 0.85 mm (range: 0.75–0.95 mm). Ocellus well developed, elliptical, set obliquely to eye margin and separated from it by its own length. Vertex brown, bearing pad-like tuft of scales shielding antenna scapes anteromedially. Antenna sockets narrowly fringed with yellow scales laterally and posterolaterally. Occiput dark brown laterally; dorsally with erect wall of moderately dark brown scales behind antennae. Patagium and tegula with mixture of brown, dark brown, and yellowish brown scales.

Forewing radius 12–15 mm. Costa narrowly pale yellow, this color broadening near apex. Sc and radius traced with white; ground grayish red between costa and Sc and between Sc and radius. Ground of cell moderate yellowish brown with varying number of scattered black scales; this ground continuing between R_5 and M_1 to apex, but beyond cell with predominance of black so as to form dark dash between upper outer margin of cell and wing apex. A similar but much smaller dash extends from base of Cu_2 distally to near M_2 – M_3 divergence. Cubitus traced with white, broadest near lower outer angle of cell, continuing distally on M_2 , M_3 , Cu_1 , and Cu_2 , broadest on M_2 . Ground between cell (Cu_2 distal to cell) and 2nd A moderate yellowish brown. 1st A narrowly traced with white distal to cell. 2nd A broadly bordered on both sides with scattered blackish scales, weakly traced with white in some specimens (this feature might be more prominent in fresh specimens). Ground posterior to 2nd A varying from moderate yellowish brown to grayish red. Termen with conspicuous black spots between veins. Basal $\frac{1}{3}$ of fringe yellow, distal $\frac{2}{3}$ brown. R_2 basally approximate to R_{3+5} , contiguous in some specimens. R_{3+4} fused, stalked with R_5 about half length of latter. M_{2+3} from lower outer angle of cell, stalked nearly half its length.

Hindwing with M_{2+3} stalked with Cu_1 nearly half length of latter.

Male genitalia (Figs. 13–17)—Uncus with lateral lobes about twice as long as wide; medial process rounded, smooth margined, armed only with a single pair of divergent short pointed cusps. Gnathos with medial process apically emarginate to about $\frac{1}{5}$ its length and thus divided into a pair of lateral lobes, these lying in the plane of the lateral gnathos arms, each bearing ventral blade-like process set at about 90 degrees to plane of lateral gnathos arms (compare Figs. 16 and 17, the latter with these blades pressed flat in the preparation). Valve with a poorly defined cusp in midregion of cucullus, and

strong patch of setae near base of costa (Fig. 13 arrow).

Female genitalia (Figs. 19, 20)—Apophyses long, straight, nearly equal in length, 2.0 times as long as 8th segment collar height and 1.3 times as long as its length. Dorsocaudal sac of 8th segment large, half as long as total 8th segment length. Ostial chamber, ductus bursae, and corpus bursae membranous, unmodified, unarmed.

Types.—Holotype: ♂ (Figs. 1, 2, 5–8, 13–16), labelled: "Curitiba, Paraná BRASIL—920m 20. XII. 1974 V. O. Becker Col."; "♂ genitalia on slide 2223 J. C. Shaffer"; "Holotype *Goya simulata* Shaffer, 1989" [NMRJ]. Paratypes: ♂, 4 ♀; ♂ (Figs. 9–12, 17), labelled: "Banhado, Quatro Barras, PR. 800 m. 7-2-70 V. O. Becker leg."; "Genitalia Slide By Jay Shaffer USNM 57902" [USNM]. 4 ♀, same locality data as holotype; "16. XII. 1974" J. Shaffer genitalia slide 2246 [NMRJ]; "14. I. 1975" undissected [NMRJ]; "4. II. 1975" (Figs. 4, 19, 20) USNM slide 57903 [USNM]; "25. XII. 1974" (Fig. 3) abdomen lost [USNM]. All paratypes bear the label: "Paratype *Goya simulata* Shaffer, 1989."

Discussion.—This species is very similar to *albivenella* in external characters. The most distinct difference is the almost complete lack of white marking of 3rd A of the forewing in *simulata* contrasted with a conspicuous white tracing over this vein in *albivenella*. Also, there is a conspicuous white tracing over the forewing 2nd A in *albivenella*, a marking much less prominent in 2 of the 6 *simulata* types and absent in the other 4. Lastly, the forewing ground color posterior to the cell is yellowish brown in *albivenella*, brown in *simulata* and in some specimens of the latter grayish red posterior to 2nd A.

The male genitalia of *simulata* and *albivenella* can be compared in Figs. 13 and 18 respectively. Three differences are noteworthy. In *albivenella* the medial process of the uncus is laterally and ventrally armed with a multitude of minute stout spines, and

bears posterolateral expansions each terminating in a large posteriorly directed spine, the two spines essentially parallel. By contrast, this process in *simulata* is lacking in minute spines, curved along its posterior margin, and armed only with a pair of short divergent conical cusps. Secondly, the medial process of the gnathos is markedly different in the two species, cordate and keeled in *simulata*, quadrate in *albivenella*. Finally, the well developed patch of setae at the base of the valve costa in *simulata* (Fig. 13 diagonal arrow) is completely absent in *albivenella*.

The female genitalia of *simulata* differ from those presumed to be *albivenella* in the more elongate shape of the 8th segment collar, 1.7 times as long as wide in *simulata*, 1.0 times in *albivenella*; in the much longer anterior and posterior apophyses, and in the longer posterodorsal sac of the 8th segment. This comparison is based on an examination of the lectotype of *cancelliella*, a junior synonym of *albivenella*. These features distinguish *simulata* from all other known species of *Goya*.

In summary, *simulata* and *albivenella* can readily be distinguished by clear differences in the male genitalia of their holotypes and it is on these differences that the distinction between the two species presently rests. The constancy of the differences in wing pattern described above can only be evaluated when a larger series of specimens of both species becomes available for study. Likewise, a good series of specimens of *albivenella* including both sexes from one population should resolve any questions as to the identity and characteristics of females of that species.

Etymology.—The specific epithet is an adjective derived from the Latin *similis* (like) in reference to the external resemblance to *albivenella*.

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The holotype and 2 female paratypes are deposited in the National Museum, Rio de Janeiro, Brazil [NMRJ]. The male paratype and two female paratypes are in the National Museum of Natural History, Smithsonian Institution, Washington, D.C. USA [USNM].

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